Homework Assignment #3
Due at midnight Sunday 11/13

Part-1

Implementing a a program that learns a neural network using stochastic gradient descent (on-line training)
main file: *nnet.py*
script: *nnet*

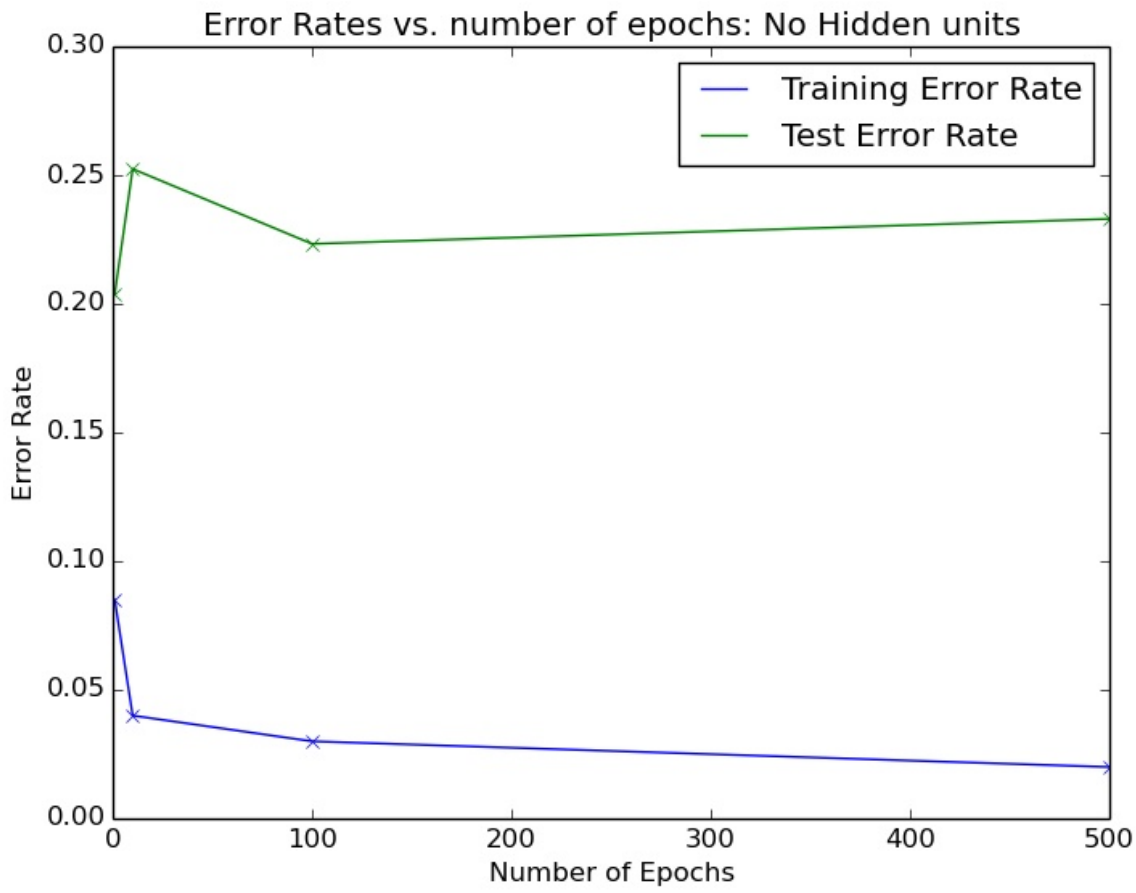
Part-2

For the heart data set, draw a plot showing how training-set and test-set error rates vary as a function of number of epochs e. Your plot should show error rates for e = 1, 10, 100, 500. Learning rate l = 0.1

Plotting source code included in *nnet_plots.py*

a) Network Structure: Single Layer (No hidden Units)

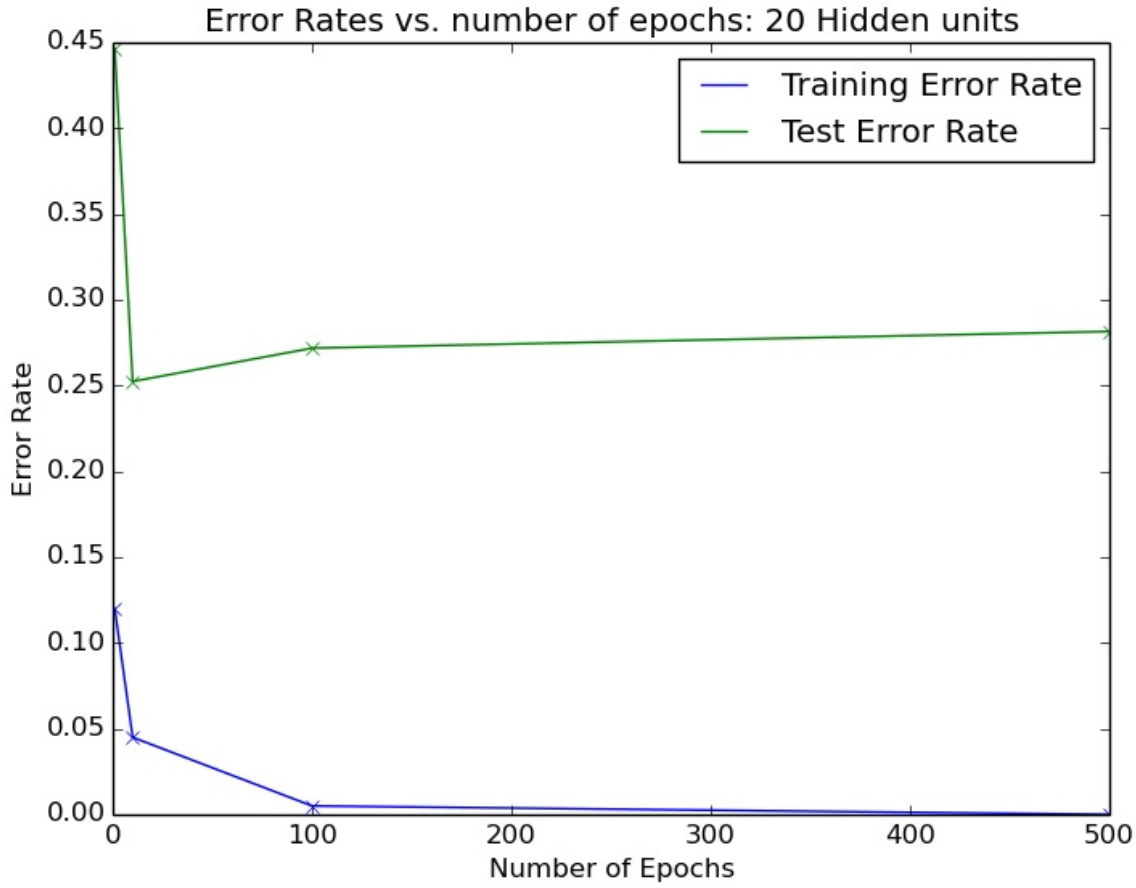
e = 1, 10, 100, 500; l = 0.1; h = 0



Number of Epochs (e)	Training Set Error Rate	Test Set Error Rate
1	0.085	0.20388349514563106
10	0.04	0.2524271844660194
100	0.03	0.22330097087378642
500	0.02	0.23300970873786409

a) Network Structure: One Hidden Layer of 20 units

e = 1, 10, 100, 500; l = 0.1; h = 0



Number of Epochs (e)	Training Set Error Rate	Test Set Error Rate
1	0.12	0.44660194174757284
10	0.045	0.2524271844660194
100	0.005	0.27184466019417475
500	0.0	0.2815533980582524

Part-3

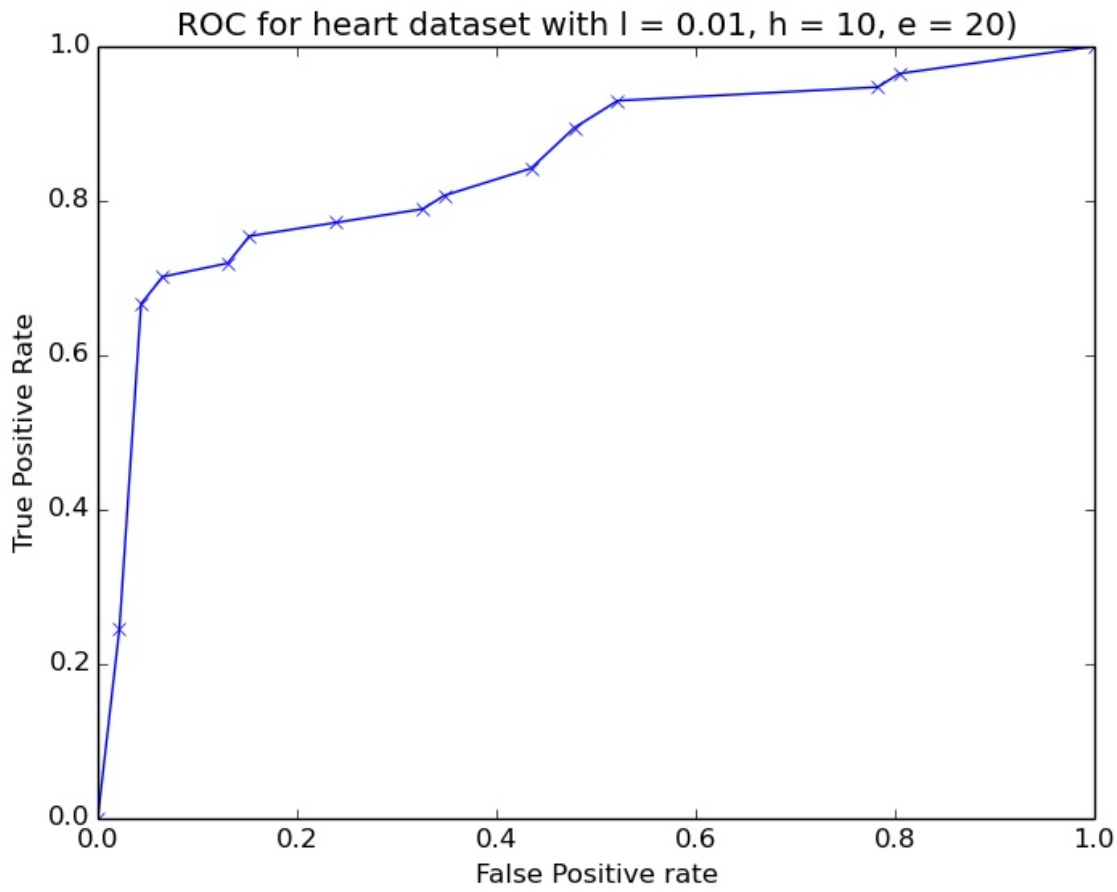
For this part, you should produce ROC curves for two data sets. Use the activation of the output unit as the measure of confidence that a given test instance is positive, and plot ROC curves for both the heart data set indicated above, and the lymphography data set: *lymph_train.arff, lymph_test.arff*. Be sure to label the axes of your plots.

Plotting source code included in *nnet*_roc.*py*

a) Heart Data Set (*heart_train.arff, heart_test.arff*)

Network Structure: One Hidden Layer of 10 units

e = 20; l = 0.01; h = 10



b) Lymph Data Set (*lymph_train.arff, lymph_test.arff*)

Network Structure: One Hidden Layer of 10 units

e = 20; l = 0.01; h = 10